There is little doubt that changes of the four types described above have occurred in the maize plant during its evolution under domestication. It cannot yet be proved that such changes were wrought by genetic changes at the Tu-tu locus, but it would be strange indeed if this were not the case. At least no other locus has yet been discovered in maize which is capable of so drastically changing the maize plant in the direction of greater usefulness to man.

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Helen P. Mangelsdorf

9. Mutation rates in teosinte derivatives.

In previous News Letters we have recorded the occurrence of a wide variety of mutations in modified strains of the inbred A158 in which one or more teosinte chromosomes have been substituted for maize chromosomes. No mutation was ever observed in the original inbred A158.

During the past year we have conducted a controlled experiment in which the mutation rates for seed and seedling characters of the teosinte-modified strains were compared directly to the original strain. In 100 ears of A158 there was one mutation to defective seeds. In 435 ears of teosinte derivatives there were 32 mutations involving 12 defective seeds, one brittle endosperm and 19 seedling defects of various types.

The mutations which have now occurred in the teosinte derivatives include most of the categories of inherited defects found in open-pollinated maize: gametophyte factors, defective seeds, chlorophyll deficiencies (albinos, virescents, stripes), brittle and sugary endosperm and dwarfs.

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Walton C. Galinat

10. Papyrescent maize.

The dominant gene which produces this glume character has been designated previously as "pseudopod" (Pp) (Galinat and Mangelsdorf, MNL, 1955) but it now seems more appropriate to use the name "papyrescent" and the symbol Pn in order to call attention to its papery character and its similarity to the "papyrescens" character of Sorghum (Rangaswami) as well as to avoid confusion with the symbols for heterozygous pericarp color (Pp).

When we first obtained the Pn character from a Peruvian variety, it was closely linked to another mutant form resembling branched silkless (bd) reported as near the long arm of chromosome 7. The associated

mutant in our stock has now been definitely located on chromosome 7 by use of E. G. Anderson's a-b translocation tester for that chromosome. Although we have grown families from about 30 Pn ears, we have only obtained one cross-over between Pn and bd.

The Pn mutant is characterized by prominent but defective glumes which consist largely of undifferentiated parenchyma cells. When the Pn glumes dry down during final maturation of the ear, they shrink to a thin, almost transparent, layer with the vascular bundles becoming prominent ridges. The glumes do not contract much in length and continue to partially cover the grains. At maturity they are papery and brittle, and are distinctly different from the glumes of tunicate maize or the normal glumes which serve to protect the caryopses of other grasses.

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11. Half-tunicate teosinte, a possible "synthetic" prototype of maize and Tripsacum.

The structure of half-tunicate teosinte fits the theoretical requirements for a common ancestor of maize and Tripsacum. Also the general structure of this synthetic derivative approximates a typical condition for the Andropogoneae. The resemblance is closest to Elyonurus tripsacoides. The slender rachis segments of half-tunicate teosinte differ from those of Elyonurus by the presence of a shallow cupule in the former and its absence in the latter. This cupule (or adnate-prophyll part of a cupule) is a definitive character separating the Andropogoneae from the American Maydeae.

If maize and Tripsacum had such a common ancestor, then evolution toward these species could have followed certain general tendencies which are prevalent in the grasses. The evolution toward primitive maize from our synthetic common ancestor would have involved longitudinal compaction and reduction to unisexual flowers. The factors for a polystichous thickened and continuous rachis in modern maize appear to represent acquisitions made chiefly during domestication as is suggested by recent studies on primitive archaeological maize. In the evolution of Tripsacum, reduction would have proceeded toward solitary instead of paired spikelets in the pistillate region. Also there would have been specialization of the cupule and outer pistillate glume as integral parts of a new protective device, the cupulate fruit case.

12. The effect of weak tunicate alleles on the expression of the Vg gene.

A collection of weak alleles at the tunicate locus has been assembled in isogenic stocks (Mangelsdorf, MNL, 1953) and these are now